REMARKS

Claims 1 and 11 have been amended. Claims 1 through 19 remain in the application.

CLAIM REJECTIONS

35 U.S.C. § 112

Claims 1 through 19 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully traverse this rejection.

The Examiner contends that the claims are not used to achieve as recited in the preamble such as "emulating machine tool behavior". Although Applicants disagree, claims 1 and 11 have been amended to clarify that the method uses transformational arrays to emulate model behavior for a programmable logic controller verification system. Therefore, it is respectfully submitted that claims 1 through 19 are allowable over the rejection under 35 U.S.C. § 112, second paragraph.

35 U.S.C. § 102

Claims 1 through 19 were rejected under 35 U.S.C. § 102(e) as being anticipated by Walacavage et al. (U.S. Patent No. 6,442,441). Applicants respectfully traverse this rejection.

U.S. Patent No. 6,442,441 to Walacavage discloses a method of automatically generating and verifying programmable logic controller code. The method includes the steps of constructing a neutral control model file, determining whether the neutral control model file is correct and generating programmable logic controller (PLC) code if the neutral control model file is correct. The method also includes the steps of verifying whether the PLC code is correct and

using the PLC code by a PLC to build a tool if the PLC code is correct. Walacavage does not disclose generating transformational arrays for a mechanical model by incrementally recording one position of each piece of geometry of the mechanical model moved through space over a period of time using a computer and viewing motion of the mechanical model in a motion viewer based on the transformation arrays using the computer to determine whether the motion of the mechanical model is acceptable. Walacavage also does not disclose replicating a motion of a mechanical model by generating a PLC code for the motion of the mechanical model using a computer if the motion of the mechanical model was acceptable and using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code with a PLC emulator.

In contradistinction, independent claim 1, as amended, clarifies the invention claimed as a method of using transformational arrays to emulate model behavior for a programmable logic controller logical verification system. The method includes the steps of constructing a mechanical model using a computer, generating transformational arrays for the mechanical model by incrementally recording one position of each piece of geometry of the mechanical model moved through space over a period of time using the computer, viewing motion of the mechanical model in a motion viewer based on the transformation arrays using the computer, and determining whether the motion of the mechanical model is acceptable. The method also includes the steps of replicating the motion of the mechanical model by generating a PLC code for the motion of the mechanical model using the computer if the motion of the mechanical model was acceptable and using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code with a PLC emulator. Independent claim 11 has been amended similar to claim 1 and includes other features of the present invention.

As to patentability, 35 U.S.C. § 102(e) provides that a person shall be entitled to a patent unless:

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for a patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent . . .

A rejection grounded on anticipation under 35 U.S.C. § 102 is proper only where the subject matter claimed is identically disclosed or described in a reference. In other words, anticipation requires the presence of a single prior art reference which discloses each and every element of the claimed invention arranged as in the claim. In re Arkley, 455 F.2d 586, 172 U.S.P.Q. 524 (C.C.P.A. 1972); Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983); Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 221 U.S.P.Q. 481 (Fed. Cir. 1984).

Walacavage '441 does not disclose or anticipate the claimed invention of claims 1 through 19. Specifically, Walacavage '441 merely discloses a method of automatically generating and verifying programmable logic controller code by generating programmable logic controller (PLC) code if a neutral control model file is correct, verifying whether the PLC code is correct, and using the PLC code by a PLC to build a tool if the PLC code is correct. Walacavage '441 lacks the steps of generating transformational arrays for a mechanical model by incrementally recording one position of each piece of geometry of the mechanical model moved through space over a period of time using a computer and viewing motion of the mechanical model in a motion viewer based on the transformation arrays using the computer to determine whether the motion of the mechanical model is acceptable. In Walacavage '441, the method uses a neutral control model file, converts the neutral control model file into a compatible PLC code

and analytically verifies the PLC code. In Walacavage '441, it is clear in Column 2, line 54. through Column 3, lines 1 through 40, that the method uses a neutral control model file and not transformational arrays to incrementally record one position of each piece of geometry of the mechanical model moved through space over a period of time. In the present application, on page 9, lines 9 through 14, the method includes generating transformational arrays based on CAD geometries during the design phase of the machinery for the mechanical model. The transformational arrays are movies of manipulation of individual components in the mechanical model and are generated with the mechanical tool design system 16 and not a neutral control model file. As a result, the neutral control model file is not the same thing as a mechanical model with the transformational arrays of the present application. As stated on page 10, lines 3 through 6 of the present application, within the motion player 30, these transformational arrays are sequenced to give a first pass rendition of what the overall machine or manufacturing line behavior will be, which is entirely different from the neutral control model file of Walacavage '441. Therefore, Walacavage '441 does not perform the steps of generating transformational arrays for a mechanical model by incrementally recording one position of each piece of geometry of the mechanical model moved through space over a period of time using a computer and viewing motion of the mechanical model in a motion viewer based on the transformation arrays using the computer to determine whether the motion of the mechanical model is acceptable as claimed by Applicants. As such, the claim language cannot be merely interpreted to read on the neutral control model file of Walacavage '441.

Walacavage '441 also lacks replicating a motion of a mechanical model by generating a PLC code for the motion of the mechanical model using a computer if the motion of the mechanical model was acceptable and using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code

with a PLC emulator. In Walacavage '441, there is a special purpose viewer or motion player such as VisLine in block 40, but there is no additional PLC emulator to play the PLC code such that the user can observe the motion of the mechanical model using the actual PLC code as if they were watching a machine or manufacturing line of a vehicle assembly plant floor. In Walacavage '441, there is a virtual PLC generator 15 that generates PLC code and a line verification system 14 that verifies the PLC code. In Walacavage '441, it is clear in Column 2, lines 37 and 39, that the line verification system 14 verifies the PLC code for the line model and not the PLC generator 15. In the present application, on page 8, lines 18 and 19, although the emulator 20 sends and receives signals with the PLC logical verification system 18, it is the verification system 18 that verifies the PLC code and not the emulator 20. As a result, the PLC generator 15 is not the same thing as the emulator 20 of the present application. As stated on page 14, lines 11 through 14 of the present application, the user 12 exports the PLC code to the PLC emulator 20 to play and visualize the PLC code, which is entirely different from the PLC code generator 15 of Walacavage '441. Therefore, Walacavage '441 does not perform the steps of replicating a motion of a mechanical model by generating a PLC code for the motion of the mechanical model using a computer if the motion of the mechanical model was acceptable and using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code with a PLC emulator as claimed by Applicants. As such, the claim language cannot be merely interpreted to read on the PLC generator 15 of Walacavage '441.

Walacavage '441 fails to disclose the combination of a method of using transformational arrays to emulate model behavior for a programmable logic controller logical verification system including the steps of constructing a mechanical model using a computer, generating transformational arrays for a mechanical model by incrementally recording one

position of each piece of geometry of the mechanical model moved through space over a period of time using the computer, viewing motion of the mechanical model in a motion viewer based on the transformation arrays using the computer, determining whether the motion of the mechanical model is acceptable, replicating the motion of the mechanical model by generating a PLC code for the motion of the mechanical model using the computer if the motion of the mechanical model was acceptable, and using the accepted motion of the mechanical model to compare the behavior of the PLC code relative to the accepted motion by playing the PLC code with a PLC emulator as claimed by Applicants. Therefore, it is respectfully submitted that claims 1 through 19 are allowable over the rejection under 35 U.S.C. § 102(e).

Based on the above, it is respectfully submitted that the claims are in a condition for allowance, which allowance is solicited.

Respectfully submitted,

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